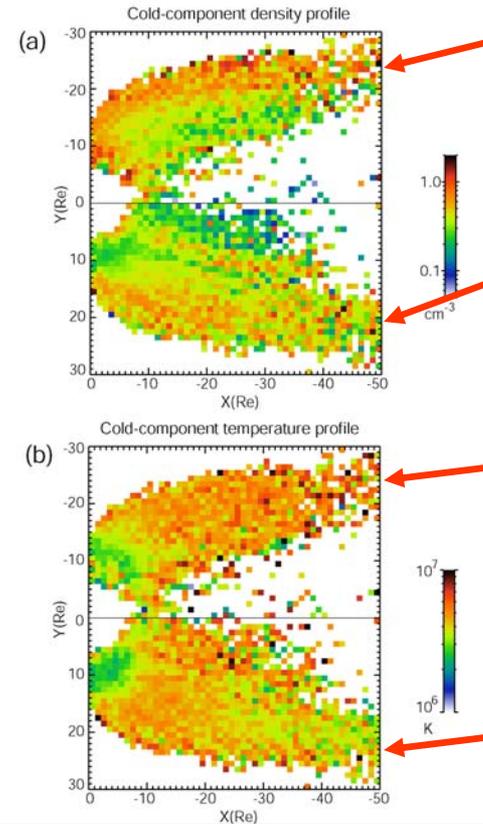


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Plasma sheet temperature and density profiles inferred from DMSP satellite observations

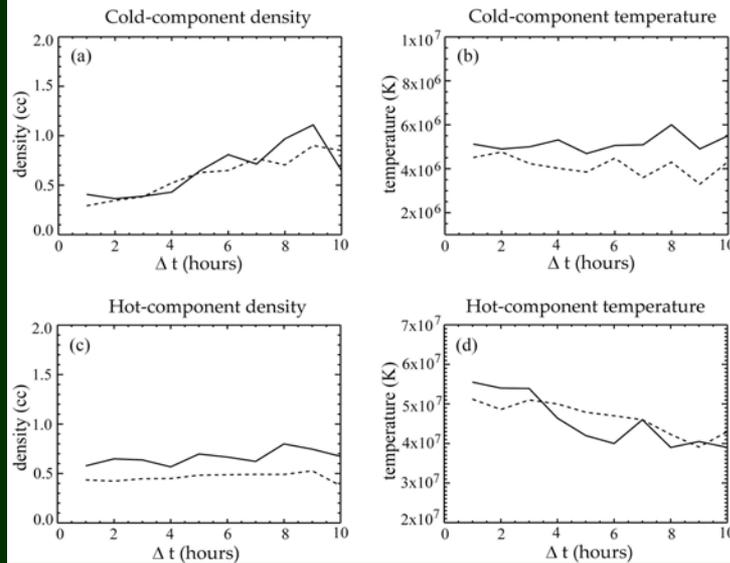
Cold-component density and temperature profiles



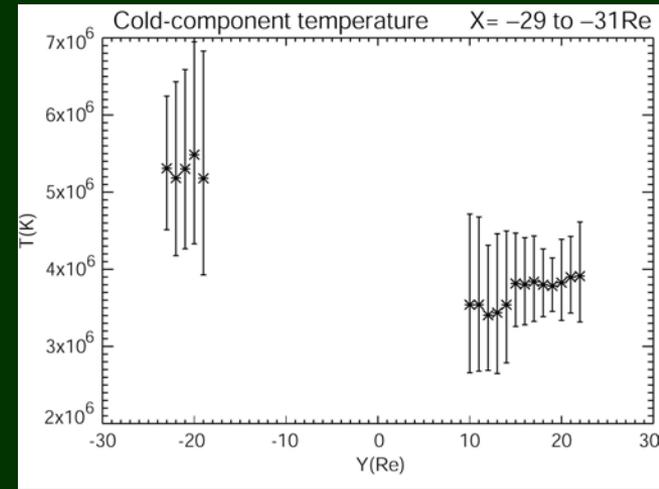
density peaks suggesting the origin of the cold component ion is solar wind

northward IMF plasma sheet cold component ion temperatures exhibit a dawn-dusk asymmetry

Evolution of cold and hot components of the two-component Maxwellian distribution



temperature and density evolutions of the cold and hot components of the northward IMF plasma sheet ions
dawn = ———
dusk = - - - - -



1D slice in Y-direction ion

Wing, S., J. R. Johnson, P. T. Newell, and C.-I. Meng (2005), Dawn-dusk asymmetries, ion spectra and sources in the northward IMF plasma sheet, *J. Geophys. Res.*, 110, A08205, doi:10.1029/2005JA011086.

Oieroset, M., J. Raeder, T. D. Phan, S. Wing, J. P. McFadden, W. Li, M. Fujimoto, H. Reme, and A. Balogh (2005), Global cooling and densification of the plasma sheet during an extended period of purely northward IMF on October 22-24, 2003, *Geophys. Res. Lett.*, 32, L12S07, doi:10.1029/2004GL021523.

The results provide observational constraints to (1) the hotly debated competing solar wind entry mechanisms into the plasma sheet and (2) plasma sheet ion transport and losses

observational constraints

cold-component (magnetosheath/solar wind) ions

- temperature dawn-dusk asymmetry (heating on the dawnside)
- rate of density increase with Δt (the number of hours IMF has been northward)

hot-component (nominal plasma sheet) ions

- rate of temperature decrease with Δt
- density

proposed mechanisms

cold-component (magnetosheath) ions

- poleward of the cusp reconnections [e.g., Song and Russell, 1992].
- K-H instability [e.g., Otto and Fairfield, 2000; Fairfield et al., 2000].
- Wave-induced diffusion, e.g., kinetic Alfvén waves [Johnson and Cheng, 1997; 2001; Chen, 1999].
- Curvature/gradient drift

hot-component (nominal plasma sheet) ions

- Loss of hotter hot-component ions, e.g., precipitation, ∇B drift ?
- wave mediated interactions with cold² component ions ?